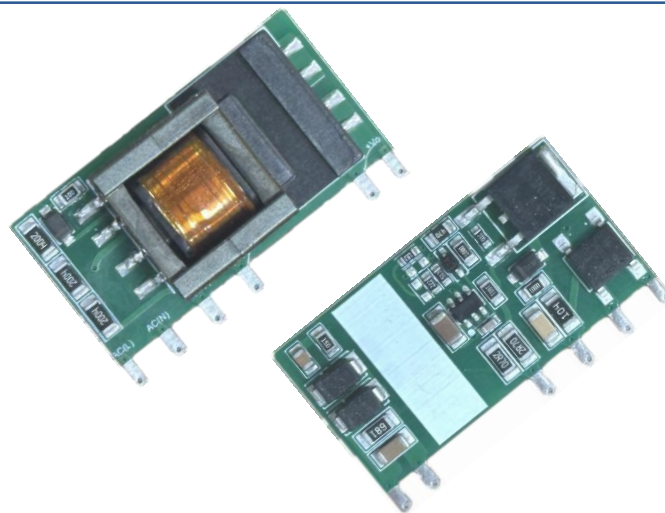


Typical Features

- ◆ Wide Input Range: 90–528 VAC / 100–745 VDC
- ◆ No-Load Power: $\leq 0.3\text{W}$ (230VAC)
- ◆ Efficiency: 78% (typical)
- ◆ Operating Temperature: -40°C to $+85^{\circ}\text{C}$
- ◆ Switching Frequency: 50 kHz
- ◆ Protection types: Short-circuit, overcurrent protection
- ◆ Isolation Voltage: 4300 VAC
- ◆ Complies with IEC/UL 62368-1, IEC/EN 60335-1, IEC/EN 61558-1
- ◆ Ultra-compact bare board, industrial-grade design
- ◆ Through-hole mounting on PCB



Application Fields

The **FG05-G5SXX** series is a high-efficiency, compact bare-board switching power supply provided by Aipu. This series complies with safety standards such as IEC/UL 62368-1, IEC/EN 60335-1,

IEC/EN 61558-1 safety standards. It features an ultra-wide input voltage range, AC/DC compatibility, low ripple, low temperature rise, low power consumption, high efficiency, high reliability, and high safety isolation. It is widely used in various fields such as industrial, office, power, and consumer applications. When the product is used in environments with poor electromagnetic compatibility, please refer to the application circuit provided by our company.

Selection Guide

Certifications	Model	Input Voltage Range		Output Specifications			Max Capacitive Load @230VAC	Ripple & Noise @20MHz (Max)	Eff. @ Nom. Input, Full Load (Typ.)
		Nominal Value (VAC)	Range Value (VAC)	Power P (W)	Voltage Vo (VDC)	Current Io (mA)	μF	mVp-p	%
-	FG05-G5S03	230	90-528	3.3	3.3	1000	2000	180	70
	FG05-G5S05			5	5	1000	1500		72
	FG05-G5S09				9	560	680		72
	FG05-G5S12				12	420	470		78
	FG05-G5S15				15	340	330		78
	FG05-G5S24				24	210	100		78

Note 1: Typical output efficiency is measured after 30 minutes of operation at full load (burn-in).

Note 2: The tolerance for typical full-load efficiency (% , Typ.) is $\pm 2\%$. Efficiency is calculated as total output power divided by the module's input power.

Note 3: Due to space constraints, this is only a partial product list. For models not listed, please contact our sales department.

Input Specifications					
Test Item	Test Conditions	Mini	Typ.	Max	Unit
Input Voltage Range	AC Input	85	230	528	VAC
	DC Input	100	-	745	VDC
Input frequency range	-	47	50	63	Hz
Input current	115 VAC	-	-	0.20	A
	230 VAC	-	-	0.10	
	480 VAC	-	-	0.07	
Inrush current	115 VAC	-	10	15	A
	230 VAC	-	17	25	
	480 VAC	-	28	40	
No-load Power	230 VAC	-	-	0.3	W
Consumption	380 VAC	-	-	0.5	
Leakage current	480 VAC/50 Hz	0.6 mA RMS Max			
Recommended Fuse Rating	-	1A, Slow-Blow (Required)			
Hot Plug	-	N/A			
Remote Control (CNT)	-	N/A			

Output Specifications						
Test Item	Test Conditions		Mini	Typ.	Max	Unit
Output Voltage Accuracy	Input voltage range, 10%–100% load (Stable operation achievable at 0%–10% load)	3.3V output	-	±3.0	±6.0	%
		Other outputs	-	±2.5	±5.0	%
Linearity	Rated load		-	±1.5	±3.0	%
Load regulation	10%–100% of Nominal Input Voltage load		-	±3.0	±4.0	%
Ripple & Noise	5%–100% load, 20 MHz bandwidth		-	100	180	mVp-p
	Note 1: Ripple & Noise measured by parallel cable method; see "Test Instructions" for details.					
Dynamic Response	25%–50%–25%	Overshoot	-5.0	-	+5.0	%
	50%–75%–50%	Recovery time	-	-	+5.0	ms
Minimum load	Single Output		10	-	-	%
Temperature Coefficient	-		-	±0.03	-	%/°C
Start-up delay time	Input 115 VAC (full load)		-	-	2000	ms
	Input 230 VAC (full load)		-	-	800	
	Input 380 VAC (full load)		-	-	700	

Power-off hold time	Input 115 VAC (full load)	5	8	-	mS
	Input 230 VAC (full load)	30	35	-	
	Input 380 VAC (full load)	90	100	-	
Output Startup Overshoot	Full Input Voltage Range	≤10			%Vo
Short-circuit Protection		Continuous, Self-recovery			Isolated
Output Over-current Protection (OCP)	Input 230 VAC	120% Io ≤ Io ≤ 200%			Isolated

General Specifications

Test Item	Test Conditions	Mini	Typ.	Max	Unit
Switching Frequency	-	-	50	-	kHz
Operating Temperature	Refer to the Temperature Derating Graph	-40	-	+85	°C
Storage temperature	-	-40	-	+105	°C
Soldering temperature	Wave soldering	260±4°C, duration 5–10 s			
	Manual soldering	360±8°C, duration 4–7 s			
Relative Humidity	-	10	-	95	%RH
Isolation Voltage	I/P-O/P, Test 1min, leakage current <5mA	4300	-	-	VAC
MTBF	MIL-HDBK-217F at 25°C	500	-	-	K hours
Vibration	-	10–55 Hz, 10G, 30 min, along X, Y, Z			
Safety Standards	-	Complies with IEC/UL 62368-1, IEC/EN 60335-1, IEC/EN 61558-1			
Safety Rating	-	CLASS II			
Weight/Dimensions	Package Type	Weight (Typ)	Dimensions L x W x H		
	FG05-G5SXX	6.5 g	33.5 x 20.0 x 13.0 mm	1.319 x 0.787 x 0.512 in	

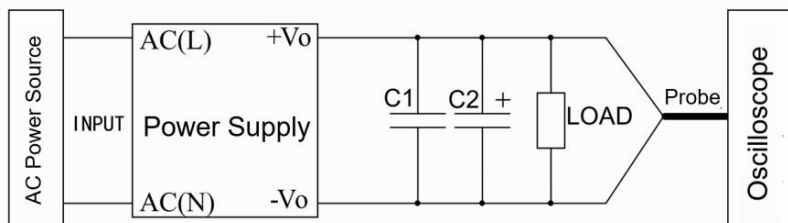
EMC Performance

Component	Sub-item	Technical Standard	Performance Criteria
EMC	EMI	CE	CISPR 32/EN 55032 CLASS A (Recommended circuit shown in Figures 2 and 5) CLASS B (see Figure 3 for recommended circuit)
		RE	CISPR 32/EN 55032 CLASS A (Recommended circuits shown in Figures 2 and 5) CLASS B (See Figure 3 for recommended circuit)
	EMS	ESD	IEC/EN 61000-4-2 Contact ±6 kV Performance Criteria B
		Radiated Immunity	IEC/EN 61000-4-3 10 V/m Performance Criteria A
		EFT	IEC/EN 61000-4-4 ±2 kV Performance Criteria B (Recommended circuits shown in Figures 2 and 5) ±4 kV Performance Criteria B (See Figures 2 and 5 for recommended circuits)
		Surge Immunity	IEC/EN 61000-4-5 Line-to-line ±2 kV Performance Criteria B (see Figure 1 for recommended circuit)

				Line to ground ± 4 kV Performance Criteria B (see Figure 2 for recommended circuit)
		CS	IEC/EN 61000-4-6	10 Vrms Performance Criteria A
		Immunity to Voltage Dips and Interruptions	IEC/EN 61000-4-11	0%–70% Performance Criteria B

Ripple & Noise Test Instruction (Parallel Cable Method, 20 MHz Bandwidth)

Test Method:



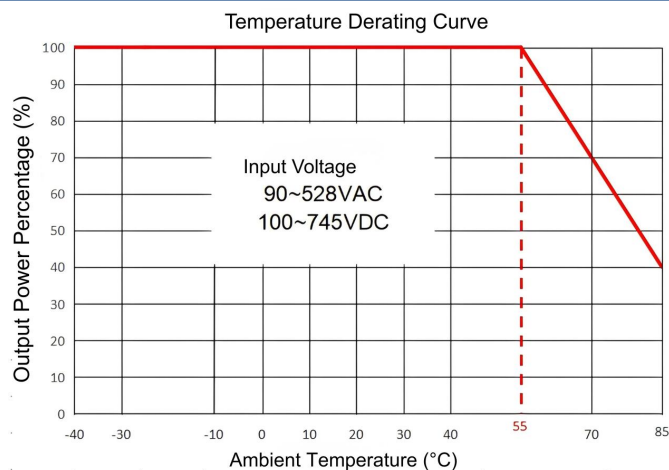
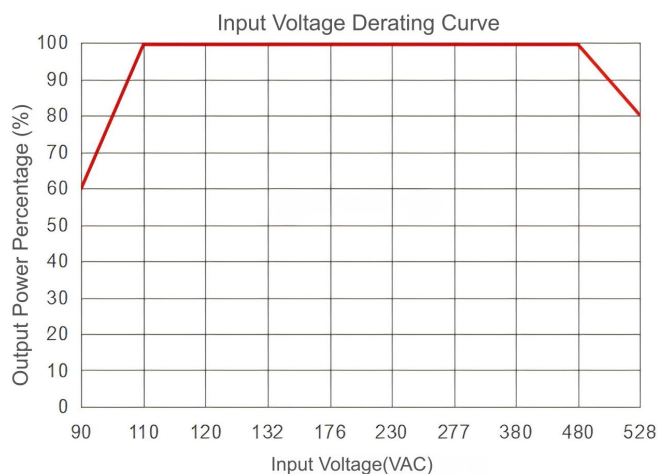
1. Test Setup

Measurements are conducted using the parallel cable method with oscilloscope bandwidths set to 20MHz and 100MHz. The oscilloscope probe must have its cap and ground lead removed to minimize interference. Additionally, a 0.1 μ F ceramic capacitor and a 10 μ F high-frequency low-ESR electrolytic capacitor are connected in parallel across the probe tip. The oscilloscope should be set to Sample mode.

2. Test Configuration

Connect the input terminals to the power source and the output terminals to an electronic load via a test fixture. Ripple and noise must be sampled directly at the output ports using dedicated sensing leads. Power cables should be insulated wires with a gauge (diameter) appropriate for the output current.

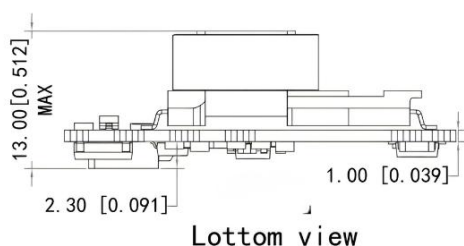
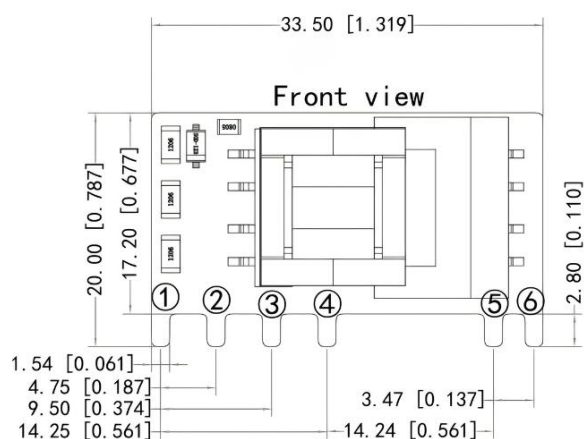
Product Characteristic Curves



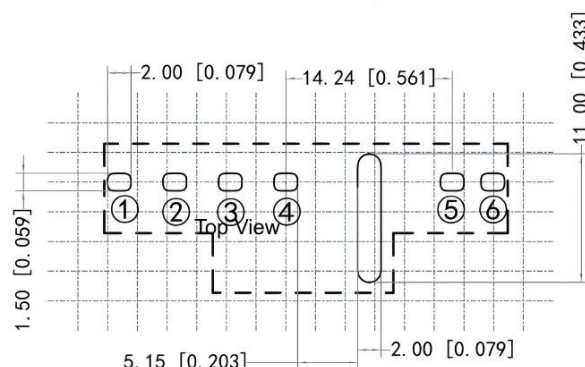
Note 1: When operating at input voltages of 90 – 110VAC / 480 – 528VAC / 100 – 155VDC / 675 – 745VDC, the output must be derated according to the Input Voltage Derating Curve.

Note 2: This product is designed for natural convection cooling. For applications in enclosed environments, please contact our technical support.

Mechanical Dimensions



Third Angle Projection



PCB Layout Vertical View
Grid 2.54×2.54 [0.10×0.10]

Unit: mm[inch]
Pin diameter tolerance $\pm 0.10[\pm 0.004]$
General tolerance $\pm 0.50[\pm 0.020]$

Pin Definitions

Pin Description	1	2	3	4	5	6
Function	AC(L)	AC (N)	+V(CAP)	-V(CAP)	-Vo	+Vo
	AC Line	AC Neutral	External Capacitor (+)	External Capacitor (-)	Negative Output	Positive Output

Typical Application & Recommended EMC Circuit

1. Typical Application Circuit

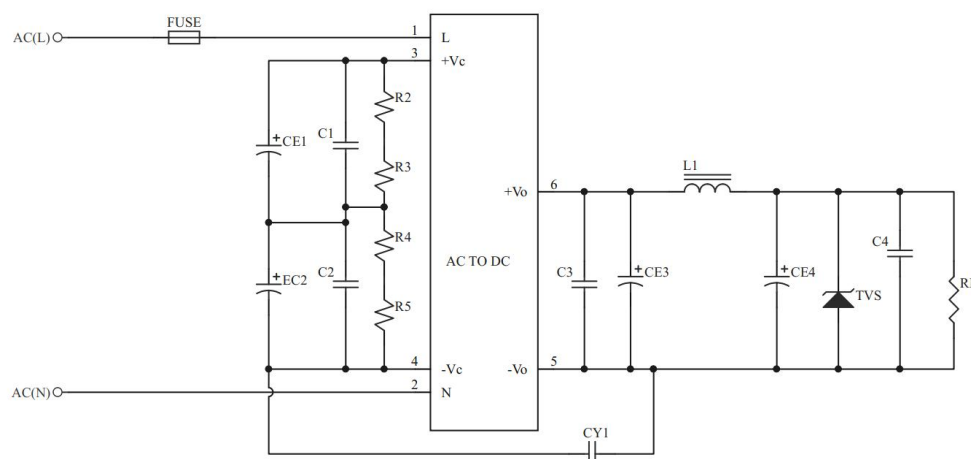


Figure 1

Model	CE1, CE2 (*)	R2, R3, R4, R5 (*)	CE3 (*)	L1 (*)	CE4 (Electrolytic capacitor must be connected)	C1, C2	C3, C4	TVS
FG05-G5S03	47 μ F/40 0V	1M Ω /1206	1500 μ F/6.3V(Solid Cap.)	2.2 μ H/5 A	680 μ F/25V	0.1 μ F/63 0 V	0.1 μ F/50 V	SMBJ7.0A
FG05-G5S05			820 μ F/16V (Solid Cap.)		330 μ F/25 V			
FG05-G5S09			470 μ F/16V (Solid Cap.)		1000 μ F/16V			SMBJ12A
FG05-G5S12			470 μ F/25V (Solid Cap.)		330 μ F/16V			SMBJ20A
FG05-G5S15			470 μ F/35V (E-cap)		100 μ F/35V			SMBJ30A
FG05-G5S24								

Recommended specifications:

- * Mandatory component / connection
- FUSE refers to a fuse; the recommended rating is 2A/600Vac, slow-blow (required);
- CE1 and CE2 are electrolytic capacitors; we recommend using a series with high ripple current and low ESR, 47 μ F/400V (required);
- R2, R3, R4, and R5 are voltage-balancing resistors, 1M Ω /1206 (required);
- CY1 is a Y-capacitor, 1nF/400V (required).

2. Recommended EMC Circuit: Basic Application Environment

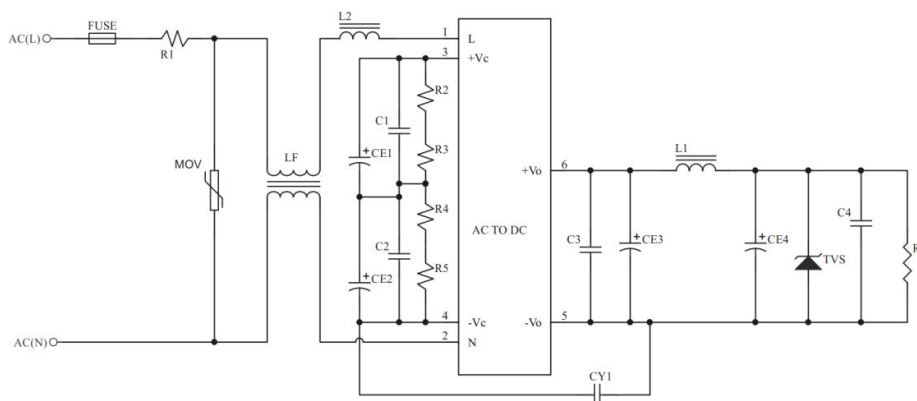


Figure 2

Recommended Parameters:

1. FUSE is a fuse; recommended rating is 2A/600Vac, slow-blow (required);
2. MOV is a varistor, 14D911K (required);
3. R1 is a wire-wound resistor, 6.8Ω/3W (required);
4. CY1 is a Y-capacitor, 1nF/400VAC (required);
5. LF is a Common Mode Choke, 30 mH/0.5 A (required);
6. L2 is a drum core inductor, 900 μH/0.5 A (required);

Note: Recommended values for other components should be determined based on the specific application, referring to Typical Application Circuits.

3. EMC Recommended Circuit: Indoor Industrial Environment

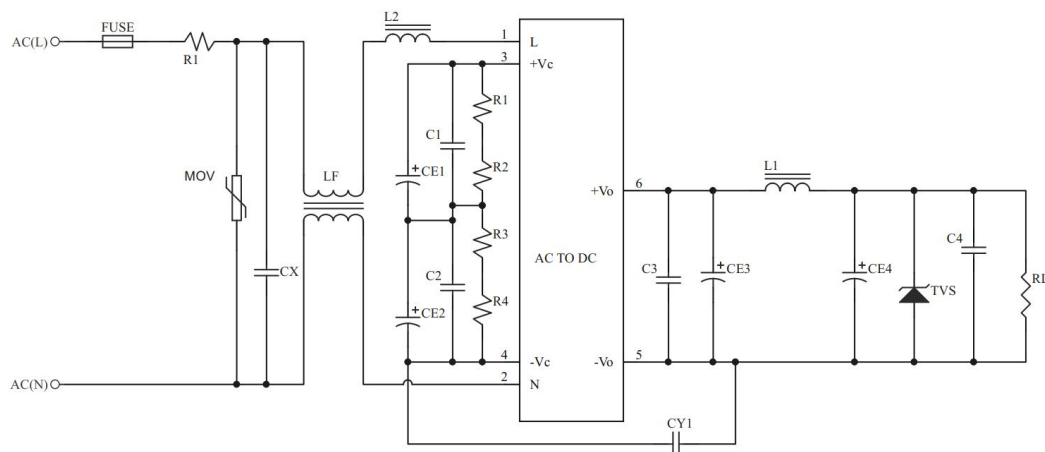


Figure 3

Recommended Parameters:

1. FUSE refers to a fuse; the recommended specification is 2A/600Vac, slow-blow (mandatory);
2. MOV is a varistor, 14D911K (required);
3. R1 is a wire-wound resistor, 6.8Ω/3W (required);
4. CY1 is a Y-capacitor, 1nF/400VAC (required);
5. CX1 is an X-capacitor, 0.22μF/530VAC (required);
6. LF is a Common Mode Choke, 30 mH/0.5 A (required);
7. L2 is a drum core inductor, 900 μH/0.5 A (required);

Note: For recommended values of other components, refer to Typical Application Circuits based on actual usage.

4. Recommended EMC Circuit: Severe Lightning Surge Environment

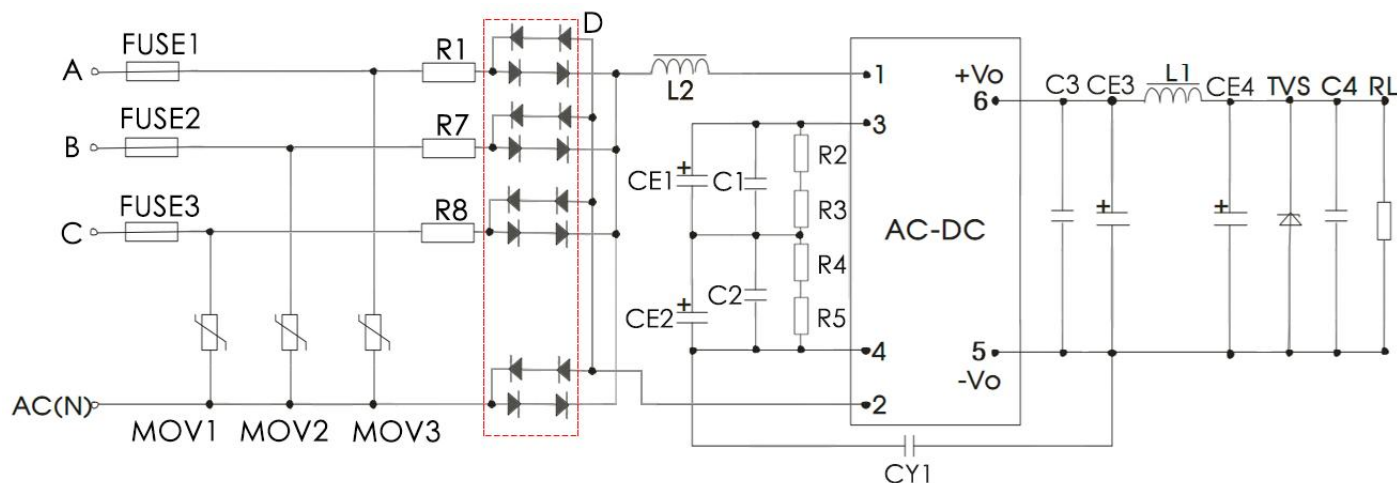


Figure 4.1: Recommended External Circuit for 4KV Differential Mode Surge (Full-wave Rectification)

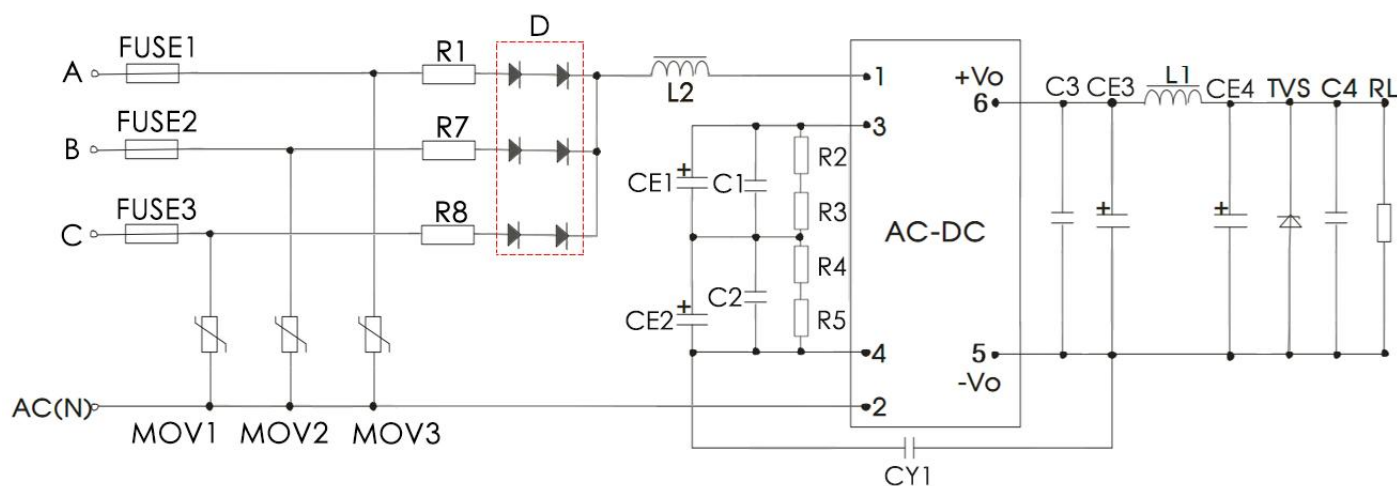


Figure 4.2: Recommended External Circuit for 4KV Differential Mode Surge (Half-wave Rectification)

Recommended Parameters

Component Part Number	Recommended Value
MOV1, MOV2, MOV3	14D911K
R1, R7, R8 (wire-wound resistors, required)	12 Ω /5W
L2	2.2 mH / Max: 4.81 Ω / Min: 0.31 A
CX	0.1 μ F/480 VAC
D	2A/1000V
FUSE1, FUSE2, FUSE3 (Required)	6.3A/600V, slow-blow
Note: R1, R7, and R8 must be through-hole wire-wound resistors. Do not use SMD or carbon film resistors.	

5. Recommended EMC Circuit: Outdoor Industrial Environment

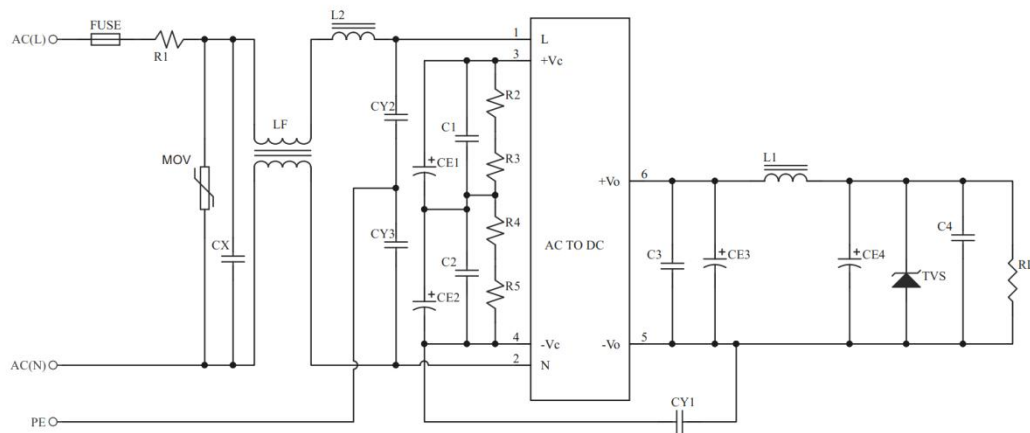


Figure 5

Recommended Parameters:

1. FUSE is a fuse; the recommended specification is 2A/600Vac, slow-blow (mandatory);
2. MOV is a varistor, 14D911K (required);
3. R1 is a wire-wound resistor, 6.8Ω/3W (required);
4. CY1, CY2, and CY3 are Y-capacitors, 1nF/400VAC (required);
5. CX1 is an X-capacitor, 0.22μF/530VAC (required);
6. LF is a Common Mode Choke, 30 mH/0.5 A (required);
7. L2 is a drum core inductor, 900 μH/0.5 A (required);

Note: For recommended values of other components, refer to Typical Application Circuits based on the actual application.

Note:

1. The product must be operated within the specified parameters; otherwise, permanent damage may occur.
2. If the product operates below the minimum load requirement, we cannot guarantee that all performance specifications in this manual will be met.
3. If the product operates beyond its specified load range, we cannot guarantee that all performance specifications in this manual will be met.
4. Unless otherwise specified, all specifications are measured at $T_a = 25^\circ \text{C}$, humidity < 75%, nominal input voltage, and rated output load (resistive load).
5. All testing methods for the specifications listed above are based on our corporate standards.
6. The specifications listed above apply to the standard models in this manual. Specifications for non-standard or customized models may vary. For specific details, please contact our technical support team.
7. Aipupower can offer customized power solutions to meet specific requirements.

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